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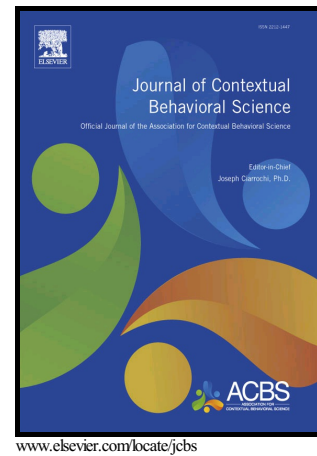
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The Self Experiences Questionnaire (SEQ): Preliminary Analyses for a Measure of Self
in People with Chronic Pain

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Abstract

Investigations of “self” in chronic pain have applied widely varied conceptualizations of the term. The purpose of the current study was to develop a measure based on the three-facet conceptualization of self rooted in the Psychological Flexibility model. Participants in this study included 528 adults referred to a pain management center who completed twenty-nine items intended as the basis for a measure called the Self Experiences Questionnaire (SEQ). Factor analyses were conducted to reduce the item pool and explore underlying dimensions. Following item and scale analyses fifteen items were selected forming a preliminary two-dimensional scale (Self as distinction, Self as observer), overall $\alpha = .90$. Adequate construct validity for the total score was supported through correlations with pain acceptance, $r = .34$, decentering, $r = .66$, and committed action, $r = .36$, all $p < .001$. Adequate predictive validity was supported through correlations with measures of patient functioning, after controlling for pain and process from the PF model, including: depression, $\beta = -.15$, $p < .01$, work and social adjustment, $\beta = -.10$, $p < .05$, and pain interference, $\beta = -.11$, $p < .05$. A preliminary measure of contextual elements of self with adequate reliability and validity emerged here. However, assessing self presents challenges and is complex. Refinements in this measure may be needed in the future.

Keywords

Chronic pain; psychological flexibility; self; Acceptance and Commitment Therapy

1. Introduction

People who struggle with chronic pain also invariably struggle with their sense of

self (Toye, Seers, Allcock, Briggs, et al., 2013). Changes in their lives, and apparent threats to physical and psychological integrity associated with chronic pain, are experienced as impacting on who they are, and perhaps who they will be in the future (Crombez, Morley, McCracken, Sensky, & Pincus, 2003). There are numerous studies of the impact of pain on “self” (e.g. Tang, Goodchild, Hester, & Salkovskis, 2010; Morley, Davies, & Barton, 2005; Compañ, Feixas, Varlotta-Dominguez, Torres-Vinals, et al., 2011; Harris, Morley, & Barton, 2003; Pincus, Pearce, & McClelland, 1993). In a systematic review of self-related processes in chronic pain, fifty-four studies were identified investigating various aspects of self (Yu, Norton, Harrison, & McCracken, 2015). Although the importance of self in pain is clear in this volume of research, it is also clear that the conceptualization and measurement of self-related processes in this research lack order or consistency. This is likely to confound the integration of accumulating evidence and impede a comprehensive ongoing examination of the role of self in chronic pain. A recently-discussed three-dimensional conceptualization of the self, rooted in the Psychological Flexibility (PF) model, could serve as an organizing framework (Yu, et al., 2015; Foody, Barnes-Holmes, & Barnes-Holmes, 2012) and prevent these problems.

The PF model is a general model of human performance and wellbeing (Hayes, Pistorello, & Levin, 2012). Psychological flexibility is defined as the ability to be open and consciously in contact with the present moment, and to change or persist in behavior when doing so serves one’s goals and values (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). The PF model includes six component processes: acceptance,

cognitive defusion, present-focused awareness, self as context, values, and committed action. These are sometimes summarized as “open, aware, and active” (Hayes, Villatte, Levin, & Hildebrandt, 2011). Increasing evidence supports the role of the key therapeutic processes from this model for people with chronic pain, including acceptance, present-focused awareness, cognitive defusion, values, and committed action (McCracken & Morley, 2014; McCracken & Vowles, 2014). There is also growing evidence for a treatment approach based on this model, Acceptance and Commitment Therapy (ACT) (Hayes, Strosahl, & Wilson, 1999), particularly in people with chronic pain (Hann & McCracken, 2014). However, the self-related processes in the model have not been adequately examined as appropriate measures are lacking.

From the perspective of PF and ACT, “self” in a broad sense is conceptualized along three dimensions: self as content, self as process, and self as context (Foody et al., 2012; McHugh, 2015). Simply put, self as content involves identifying the self with the content of one’s psychological experiences. This is more or less a conventional sense of self in which “I” am the sum of my thoughts and feelings, including I am what my thoughts say I am. Self as process involves an ongoing awareness of one’s experience such as thoughts, feelings and sensations. Self as context, somewhat more unusually, involves separation from, or de-identification with, one’s psychological experiences, an experience of being bigger than or above one’s thoughts and feelings. Metaphorically speaking self as context is like a perspective one can take on one’s thoughts and feelings, a perspective that includes a distinction between self and these experiences, a sense of self as “container” of

one's thoughts and feelings, or like a "place" where one's thoughts and feelings occur. From the point of view of PF, over-attachment to self as content can entail restricted or avoidant behavior, while self as context, facilitated by the awareness of ongoing experiences (self as process), can promote more effective and engaged patterns of behavior, with the capacity to persist or change these patterns, guided by goals and values.

The purpose of this study was to develop a measure of self-related processes based on the three-dimensional conceptualization of the self in the PF model in a sample of people with chronic pain. The study includes preliminary analyses of the reliability, validity, and potential utility of the measure. It was expected that three psychometrically adequate and theoretically consistent scores from the measure being developed would significantly and moderately correlate with other measures of PF, supporting construct validity. It was also expected that these scores would correlate significantly with measures of depression and daily functioning and do so independently from other established PF processes, as a demonstration that the dimensions of self captured in the measure have potentially unique therapeutic relevance.

2. Method

2.1 Sample

Participants for this study were 528 adults (65.2 % women) consecutively seen in a pain management service in central London. Average age was 47.2 (SD=12.0) years old. Mean years of education was 13.6 (SD=3.9) years. Most self-described

themselves as white (n=426, 80.7%), followed by black (n=44, 8.3%), Asian (n=24, 4.5%), mixed (n=16, 3.0%), and other (n=14, 2.7%). Median pain duration was 105 months (range: 12-744). Many people reported generalized pain (n=165, 31.4%). The most affected specific pain site was lower back (n=469, 88.8%), followed by lower limbs (n=423, 80.1%), neck (n=327, 61.9%), upper shoulder or upper limbs (n=322, 61.0%), pelvic region (n=264, 50.0%), head or face (n=192, 36.4%), abdominal region (n=178, 33.7%), chest (n=126, 23.9%), anal or genital region (n=91, 17.2%). About half of the participants were out of work due to pain (n= 261, 49.4%), 2.1% (n=11) were out of work due to problems unrelated to pain. Only 13.8% (n=73) of the participants were employed full-time, 11.2% (n=59) part-time, and 7.8% (n=41) were homemakers, carers, or volunteers. All participants completed the items that would later form the SEQ, along with other measures, on the first day of treatment. All participants provided their permission for their data to be used in research and the database was granted ethics and Research and Development Department approval.

2.2 Measures

2.2.1 Self Experiences Questionnaire (SEQ)

The Self Experiences Questionnaire is the inventory being developed in the present study to measure self-related process within the PF model. The first and second author constructed 34 items based on the three-dimensional conceptualization of the self through a process of discussion and consensus. The 34 items were sent to six specialist psychologists from a pain management center for their independent ratings of clarity and theoretical consistency of each item. In

addition, two experts in psychological flexibility and self-related research were consulted for their input employing the same rating dimensions and for additional comments and advice. The first and second author then refined the 34 items incorporating feedback from the clinicians and topic experts. Through this process, five items were dropped from the item pool and some re-wording of several items was done. No additional items were suggested. An item pool of 29 items was submitted for data collection. All items are rated on a 0 to 6 scale from “never true” to “always true”.

2.2.2 Chronic Pain Acceptance Questionnaire (CPAQ-8)

The Chronic Pain Acceptance Questionnaire is a 20-item scale for accessing acceptance of chronic pain (McCracken, Vowles, & Eccleston, 2004). All items are rated on a 0 to 6 scale from “never true” to “always true”. Higher score indicates greater acceptance of pain. An eight-item form has been validated and was used here (Fish, McGuire, Hogan, Morrison, & Stewart, 2010). The reliability of the eight-item scale was acceptable in the current study, $\alpha=.70$.

2.2.3 Experiences Questionnaire (EQ)

The EQ is a self-report measure with 20 items that assesses “decentering”, the ability to observe one’s thoughts and feelings as temporary, objective events, as opposed to the reflection of the self or reality (Fresco, Moore, van Dulme, Segal, et al., 2007). All items are rated on a 1 to 5 scale from “never” to “all the time”. All items are positively keyed. The decentering score is derived from 12 items and has been validated in people with chronic pain (McCracken, Gutiérrez-Martínez, &

Smyth, 2014). The reliability of the 12-item scale was good in the current study, $\alpha=.87$.

2.2.4 Committed Action Questionnaire (CAQ)

The CAQ is a self-report measure with 20 items that assesses committed action. All items are rated on a 0 to 6 scale from “never true” to “always true” (McCracken, 2013). A shortened and previously validated version of eight items was used here (McCracken, Chilcot, & Norton, 2015). Four items are positively keyed, four negatively. The reliability of the eight-item scale was good in the current study, $\alpha=.83$.

2.2.5 Patient Health Questionnaire (PHQ-9)

The PHQ-9 is a ten-item self-report assessment for depression severity. The first nine items represent symptoms of depression and are rated on a 0 to 3 scale from “not at all” to “nearly every day”. The last item is rated on a scale of impact or difficulty from “not difficult at all” to “extremely difficult”. The total score of the first nine items reflects the severity of depression, with higher score reflecting higher level of severity of depression. The PHQ-9 is regarded as a reliable and valid index of depression severity (Kroenke, Spitzer, & Williams, 2001).

2.2.6 Work and Social Adjustment Scale (WSAS)

The WSAS is a five-item self-report measure that assesses what is referred to by the authors as “functional impairment” in terms of work, home management, social leisure, private leisure and personal or family relationships. All items are rated on a 0 to 8 scale from “no impairment” to “very severe impairment”. The WSAS is regarded

as a reliable and valid index of impairment in functioning attributable to an identified problem (Mundt, Marks, Shear, & Greist, 2002).

2.2.7 Brief Pain Inventory (BPI)

The BPI interference scale is a self-report measure of the impact of pain on daily functioning (interference) (Cleeland, & Ryan, 1994). Interference from pain is rated for general activity, mood, walking ability, normal work, relations with other people, sleep, and enjoyment of life, with one item for each domain. All items of the interference scale are rated on a 0 to 10 scale from “does not interfere” to “completely interferes”. The BPI interference scale is regarded as a reliable and valid index of pain-related interference with daily functioning (Cleeland, & Ryan, 1994).

2.3 Statistical analysis

Instead of traditional exploratory factor analysis, exploratory item factor analyses (IFA) (Wirth & Edwards, 2007) based on the polychoric correlation matrix was conducted to examine construct validity using FACTOR version 10.3.01 (Lorenzo-Seva, & Ferrando, 2006) including an unweighted least squares estimator. Models and estimation methods for continuous (i.e., interval or ratio scale) data are not appropriate for item-level data that are categorical in nature. The common linear factor model assumes that the outcomes are continuous, follow a multivariate normal distribution, and that a linear relationship exists between the observed and latent variables. The assumption of multivariate normality is easily violated with item level categorical data. Item factor analysis (IFA) offers an appropriate alternative to the common linear factor model when modeling categorical item-responses as

polychoric rather than Pearson correlations are used (Mislevy, 1986).

Since IFA is essentially a re-parametrization of an item response model (Item Response Theory; IRT) - specifically a multi-dimensional normal ogive model (Reckase, 1985) - the results were also expressed using item response difficulty and discrimination parameters. A basic concept of IRT is that the relation between persons' latent trait levels and their probability of endorsing a given item in a trait-consistent manner is expressed by a response curve with certain characteristics, the item information curve (Edelen & Reeve, 2007). The item difficulty parameter (d) represents the points on the scale of latent trait, at which the probability of endorsing one category is equal to the probability of endorsing the next category. This can also be interpreted as the point where, on the latent trait continuum, the category response of one category becomes relatively more likely than the previous category. The item discrimination parameter (a) or "slope" represents the item's ability to differentiate between people at a continuous level of the latent trait. Related to the factor loading, it describes how sensitive the item is to the change of level of the latent trait. It indicates the item discrimination in each dimension when a multi-dimensional model is applied.

The initial item pool of 29 items was submitted to preliminary analyses using SPSS version 21. All items were coded in the direction that higher scores reflect a higher level of psychological flexibility (here items reflecting defense of or entanglement with self as content were reversed). Item response frequencies were examined to identify items with skewed response distributions. Then, inter-item

correlations were examined to identify items that did not correlate adequately with other items of the item pool. Following the preliminary analysis, retained items were submitted to IFA. Parallel analysis (PA) was conducted to determine the number of factors to retain (Horn, 1965). Factor loadings retain the usual interpretation as the correlation between the item and the latent factor. Reliability of the total scale was estimated using Cronbach's α . Reliability for factors was estimated based on Mislevy and Bock's statistic (Bock & Mislevy, 1982), reflecting the proportion of variance in a group of items' factor score accounted for by the underlying common latent variable. Correlations with measures of other processes of the PF model, including pain acceptance (CPAQ-8), decentering (EQ), and committed action (CAQ-8) were conducted to demonstrate construct validity. Correlations with measures of functioning including depression (PHQ-9), functional impairment (WSAS), and interference (BPI), were conducted to demonstrate predictive validity. A series of hierarchical regressions were conducted to examine the unique role of SEQ in relation to functioning including depression, functional impairment, and pain interference. Missing data were deleted listwise in correlation and regression analyses. Only cases with full data for SEQ ($n=582$) were included in item factor analysis.

3. Results

3.1 Preliminary analyses

Histograms and Q-Q plots for each of the 29 items from the SEQ were examined.

All variables were considered approximately normally distributed with no indication

of bi-modality. Furthermore, all items produced responses across the full rating scale from 0 to 6, with a median of 2 to 4. FACTOR 10.3.01 does not allow missing data.

Therefore only participants with complete data for SEQ (83.8%) were included.

Scatter plots for all variable pairs involved in correlation analyses were examined with no clear non-linear relations found. The inter-item polychoric correlation matrix for the complete cases was examined (available from the second author). A set of five items (item 3, 13, 16, 24, 25) correlated with most other items in the unexpected direction. As all items were scored in the same direction, with the intent that higher scores reflected higher psychological flexibility, this set of items was excluded from item factor analysis.

3.2 Item factor analysis

To investigate dimensionality of the item set the remaining twenty-four items relating to self were initially submitted to item factor analysis with oblique rotation, and parallel analysis. The result from parallel analysis suggested a two-dimension solution. The item set primarily loaded onto factor 1 (item 2, 4, 5, 6, 7, 9, 11) appeared to reflect separation or distinction from one's thoughts and feelings or from the conceptualized self (e.g. Although I can get caught up with my own thoughts, emotions, and sensations, I can also separate myself from them.), therefore this dimension was labeled "Self as distinction." The item set primarily loaded onto factor 2 (item 15, 19, 21, 23, 26, 27, 28, 29) appeared to reflect a sense of self as observer of one's psychological experiences, or a "perspective-taking" sense of self, therefore this dimension was labeled as "Self as observer" (e.g. Above

all my experiences, there is a sense of my self who is noticing them). Item 14 showed high cross-loading on factor 1 and factor 2, therefore it is excluded from further analysis.

Further IFA was conducted with the remaining twenty-three items (excluding item 14), with oblique rotation and parallel analysis. A two-factor solution achieving 50.2% explained variance emerged. The factor labelled “Self as distinction,” accounted for 30.3% of variance, and “Self as observer,” accounted for 19.9% of variance. The two factors achieved good reliability, .88, .87 respectively. Table 1 shows factor loadings, discrimination patterns, and category intercepts for the twenty items. Category intercepts for the items included in exploratory factor analysis were examined. The parameters were generally spread along the trait continuum. The intercepts between each two response categories varied, indicating some items are more difficult in the lower end on the trait continuum, and some items are more difficult in the middle or higher end on the trait continuum.

[Table 1 about here]

The fifteen items that reflected two dimensions of self were selected to form the preliminary scale, which essentially reflects a flexible or contextual sense of self. These dimensions do not precisely reflect the original three-dimension conceptualization of the self, but clearly fit one of these dimensions, self as context or the “contextual self” (CS). We therefore labelled the fifteen items accordingly as measure of CS. The two factors correlated moderately (.50). The fifteen-item scale demonstrated good reliability, $\alpha=.90$. Table 2 shows the twenty-nine items from the

original item pool, with the fifteen items from the final version of the SEQ marked.

[Table 2 about here]

3.3 Validity

3.3.1 Correlation analyses

Preliminary correlations were conducted for the summary score of the fifteen items from the SEQ as a measure of CS and participants' background measures to examine the relations between score of CS and participants' background information. The score of CS was significantly correlated with age, $r=.21$, $p<.001$, but not years of education, $r=.04$. It significantly correlated with pain duration, $r=.13$, $p<.01$, and current pain intensity, $r=.12$, $p<.01$, but not pain intensity in the past week, $r=.08$.

A series of correlation analyses were performed for the summary scores of CS to explore its construct validity and its relations to daily functioning. Table 3 shows the correlations between the summary score of the selected fifteen item scale (CS), as well as the subtotal scores of the dimensions of SEQ, and other measures of psychological flexibility, and measures of functioning.

[Table 3 about here]

The CS summary score of the SEQ was significantly correlated with all three measures of PF, with a range from $|r|=.34$ to $|r|=.66$, in the expected directions. This summary score of the SEQ was also significantly correlated with depression, work and social adjustment, and pain interference.

Scores from the two separate factors were significantly correlated with the

measures of PF. Self as distinction significantly correlated with all three measures of functioning. The Self as observer significantly correlated with depression and work and social adjustment but not pain interference.

3.3.2 Regression

A series of multiple regression analyses were conducted to examine the potential unique role of CS, along with other processes within the PF model, in relation to functioning. The total score of PHQ-9, WSAS, and the mean score of BPI interference scale were chosen in the models as dependent variables. Three models were examined separately for each dependent variable, the first model including pain and the CS total from the SEQ as predictors, the second model including pain, acceptance of pain, and CS as predictors, and the last model including pain, committed action, and CS as predictors. The multiple regressions were done hierarchically, in that participants' demographic variables, including age, gender, ethnic group, years of education, and duration of pain were entered in the first block, and then pain and acceptance of pain or committed action were entered in the second block, and CS was entered last in each model.

None of the demographic variables contributed significantly to the variance explained in any of the models, thus they were not reported here. Table 4 shows the results from regression analyses.

[Table 4 about here]

CS added significantly explained variance in all three models controlling for pain, 5% in the model for depression, 3% work and social adjustment, and 2% pain

interference. Out of the three models controlling for pain and pain acceptance, CS contributed significantly explained variance in the model for depression, 2%, but not in the model for work and social adjustment or pain interference. Out of the three models controlling for pain and committed action, CS contributed significantly explained variance in the models for work and social adjustment, 1%, and pain interference, 1%, but not depression.

4. Discussion

The current study examines “self” as based on the PF model in the context of chronic pain. The aim of the study was to develop a preliminary measure of self-related processes. The Self Experiences Questionnaire (SEQ) that emerged here appears to yield reliable data that provide the basis for valid inferences related to “self as context” elements of self, with perhaps a few caveats. Each of the dimensions identified and a composite dimension (CS) made up of the two dimensions demonstrated sufficient internal consistency. The content validity of the SEQ is supported by the development process that included consensus decision making from two authors and input from experts in both the theoretical and clinical domains. Construct validity was supported by statistical analyses that showed significant moderate correlations between the SEQ scores and measures of other processes of psychological flexibility, and with measures of functioning. In regression analyses, CS showed a unique role in accounting for variance in functioning independent from pain and other measures of psychological flexibility; however, the variance it accounted for was small.

On the positive side, the SEQ appears to be a potentially sound measure of CS, and this process appears to relate to important aspects of the functioning of people with chronic pain. On the negative side, we failed to develop a measure that reflects the planned three dimensions of self that emerge within the PF model. We also did not show a strong unique role of the CS score from SEQ in functioning independent from other processes of PF.

The SEQ is a preliminary measure of self within the PF model. Among studies of chronic pain, there have been some investigating processes consistent with this contextual sense of self, such as self-compassion (Costa, & Pinto-Gouveia, 2011, Vowles, Sowden, & Ashworth, 2014), and decentering (McCracken et al., 2014). However, none of these has been specifically focused directly on self from the PF perspective as done here. The measure being developed here is an initial attempt to address this gap.

We failed to capture the dimension of self as ongoing process. Among the twenty-four items initially submitted to exploratory factor analysis, only four (item 10, 14, 22, 28) were based on self as process. Therefore, the failure in capturing this dimension may be due to the lack of items constructed for this dimension. Another reason for the failure in reflecting the theoretical dimensions may be that the three senses of self in the initial conceptualization are highly correlated and interactive processes. In such circumstances conventional item analyses may encounter problems in distinguishing them into relatively unique and correlated sets. In fact, one item with an emphasis on Self as process (item 28) primarily loaded onto the Self

as observer dimension, suggesting this inter-correlated nature in the dimensions of the self model. It is worth noting that the three-dimensional conceptualization of the self is a non-technical (so called “mid-level”) concept of the self that is applied in PF and ACT, and precise empirical validation of the model remains to be done.

Potential explanations aside, results from our data do not support the three-dimension model of the self. While it could be practically useful to have tools that capture the impacts of current methods applied within ACT, it appears premature to make definitive distinctions among the dimensions of self commonly made in PF as if they are empirically supported or even theoretically necessary. Future work pursuing the three dimensions could include refining the item pool employed here to achieve a more balanced number of items in each dimension. We suggest that future research ought to continue to refine and test the three-dimension conceptualization of the self using confirmatory factor analysis and, at the same time, remain open the possibility of a more useful conceptualization.

Although a factor structure that reflects the original planned three-dimensional framework failed to emerge, the qualities in the factors that emerged are conceptually consistent with the content and context dimensions of self in PF and ACT. We note that there has been empirical evidence supporting separate “distinction” versus “hierarchical” deictic relations between the self and one’s psychological content (Foody, Barnes-Holmes, & Barnes-Holmes, 2013). These relations entail contrasting notions, “you are distinct from your thoughts” versus “you are the context in which your thoughts appear,” relations that may underlie the

conceptualization of self in PF (Foody, et al., 2013). The content of CS (Self as distinction and Self as observer) developed in the current study has clearly captured qualities of the distinction (e.g. I am able to separate myself from my thoughts and feelings) as well as hierarchical (e.g. Above all my experiences, there is a sense of my self who is noticing them) deictic relations relevant to self, perspective-taking, and the content of one's psychological experiences.

The senses of self we measure here are somewhat counter-intuitive. They do not easily emerge from an ordinary language environment, from the ways we see the world and speak about it in everyday life; therefore these dimensions of self might be particularly difficult for participants to report. Although the factors did not reflect the proposed three-part model, they performed in the expected direction in relation to measures of psychological flexibility and functioning. Again, as these are preliminary analyses of the measure, this is a first attempt to reflect these in a measure, as far as we know, and as the identified factors all fit within a conceptualization of CS, it would appear that these results are a useful step.

The measure showed the unique role of CS independent from pain acceptance or committed action in predicting functioning. Practically speaking, however, the percentages of variance accounted for were very small. While this is not ideal it is perhaps not entirely unexpected, as the processes within the PF are theoretically defined as overlapping. Therefore, partitioning out the shared variance of CS with pain acceptance or committed action apparently limited the ability of the CS variable to emerge as a significant predictor. We also controlled for covariates and gave

better-established measures of PF processes a statistical advantage by testing these measures in the first step of hierarchical regression models – this represents a conservative way to test the role of CS.

Future studies may reinvestigate the uniqueness of the PF facets as we conceive them now and perhaps seek solutions that achieve related and independent measurements. Perhaps experimental investigation of self experiences and other PF processes that include specific manipulations represent a potential strategy to tease out the independent role of these processes in relation to functioning. Mediation analysis with longitudinal data in trials of ACT may be another means. If unique facets as we now call them are unattainable in data, perhaps adjustment of the underlying conceptual framework may be needed, perhaps there is a more useful way to talk about and organize treatment delivery and clinical research.

As a preliminary exploration of new psychological processes, the current study is limited. First, all participants are referrals to one multidisciplinary pain management center in central London. The results from this sample may not be generalized to people with chronic pain who are not referred to a pain management center, or chronic pain population in other geographical locations or other cultures. The SEQ needs to be further tested and validated in other samples. Second, the current study is not an experimental study or randomized control trial, therefore causal relationship cannot be drawn between self as assessed here and daily functioning. Further study with experimental manipulations and longitudinal designs is needed. Third, as noted, the relations of CS with daily functioning, independent from other processes

of PF were very small. In addition to the inter-correlated nature in the PF processes, this could also be due to a limitation in the instrument. As we say, this contextual sense of self is subtle, difficult to detect and describe, and therefore a great challenge for assessment with a self-report instrument. Perhaps training is required to accurately report this aspect. Again, further study with longitudinal designs, including change of this sense of self over time, and incorporating in these analyses the effect of training on the assessment process itself is need.

In summary, the SEQ appears to be yield adequately reliable and valid data with respect to contextual self, albeit with some limitations. Further study may one day lead to refinements in the assessment of self and possibly in the ways that we conceptualize psychological flexibility. With the SEQ further investigation of the role of self-related variables in treatment for chronic pain now appears feasible and is recommended.

Reference

- Bock, R. D., & Mislevy, R. J. (1982). Adaptive EAP estimation of ability in a microcomputer environment. *Applied Psychological Measurement*, 6(4), 431-444.
- Cleeland, C., & Ryan, K. (1994). Pain assessment: global use of the Brief Pain Inventory. *Annals of the Academy of Medicine*, 23, 129-38.
- Compañ, V., Feixas, G., Varlotta-Dominguez, N., Torres-Vinals, M., Aguilar-Alonso, A., Dada, G., et al. (2011). Cognitive factors in fibromyalgia: The role of self-concept and identity related conflicts.

Journal of Constructivist Psychology, 24, 56-77.

Costa, J., & Pinto-Gouveia, J. (2011). Acceptance of pain, self-compassion and psychopathology: Using the Chronic Pain Acceptance Questionnaire to identify patients' subgroups. *Clinical Psychology & Psychotherapy*, 18, 292-302.

Crombez, G., Morley, S., McCracken, L. M., Sensky, T., & Pincus, T. (2003). Self, identity and acceptance in chronic pain. In J. O. Dostrovsky, D. B. Carr, M. Koltzenburg (Eds.), *Proceedings on the 10th World Congress on Pain*, 651-659. Seattle: IASP Press.

Edelen, M. O., & Reeve, B. B. (2007). Applying item response theory (IRT) modeling to questionnaire development, evaluation, and refinement. *Quality of Life Research*, 16(1), 5-18.

Fish, R.A., McGuire, B., Hogan, M., Morrison, T.G., & Stewart, I. (2010) Validation of the Chronic Pain Acceptance Questionnaire (CPAQ) in an Internet sample and development and preliminary validation of the CPAQ-8. *Pain*, 149, 435-43.

Foody, M., Barnes-Holmes, D., & Barnes-Holmes, Y.(2012). The role of self in acceptance and commitment therapy. In *The Self and Perspective Taking*, 125-142, 2012. Oakland, CA: New Harbinger Publications.

Foody, M., Barnes-Holmes, Y., Barnes-Holmes, D., Luciano, C. (2013). An empirical investigation of hierarchical versus distinction relations in a self-based ACT exercise. *International Journal of Psychology & Psychological Therapy*, 13(3), 373-388.

Fresco, D.M., Moore, M.T., van Dulmen, M.H., Segal, Z.V., Ma, S.H., Teasdale, J.D., et al.(2007). Initial psychometric properties of the experiences questionnaire: validation of a self-report measure of decentering. *Behavior Therapy*, 38, 234-46.

Hann, K.E., & McCracken, L.M. (2014). A systematic review of randomized controlled trials of

- Acceptance and Commitment Therapy for adults with chronic pain: Outcome domains, design quality, and efficacy. *Journal of Contextual Behavioral Science*, 3, 217-27.
- Harris, S., Morley, S., & Barton, S.B. (2003). Role loss and emotional adjustment in chronic pain. *Pain*, 105, 363-70.
- Hayes, S.C., Luoma, J.B., Bond, F.W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes and outcomes. *Behaviour Research and Therapy*. 44,1-25.
- Hayes, S.C., Pistorello, J., & Levin, M.E.(2012). Acceptance and commitment therapy as a unified model of behavior change. *The Counseling Psychologist*, 40, 976-1002.
- Hayes, S.C., Strosahl, K.D., & Wilson, K.G. (1999) *Acceptance and commitment therapy: An experiential approach to behavior change*: Guilford Press.
- Hayes, S.C., Villatte, M., Levin, M., & Hildebrandt, M. (2011). Open, aware, and active: contextual approaches as an emerging trend in the behavioral and cognitive therapies. *Annual Review of Clinical Psychology*, 7, 141-68.
- Horn, J.L. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika*. 30, 179-85.
- Kroenke, K., Spitzer, R.L., & Williams, J.B. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine*. 16, 606-13.
- Lorenzo-Seva, U., & Ferrando, P.J.(2006). FACTOR: A computer program to fit the exploratory factor analysis model. *Behavior research methods*, 38, 88-91.
- McCracken, L. M., Chilcot, J., & Norton, S. (2015). Further development in the assessment of psychological flexibility: A shortened Committed Action Questionnaire (CAQ-8). *European Journal of Pain*, 19(5), 677-685.

- McCracken, L.M. (2013). Committed action: an application of the psychological flexibility model to activity patterns in chronic pain. *The Journal of Pain*, 14, 828-35.
- McCracken, L.M., & Morley, S. (2014). The psychological flexibility model: A basis for integration and progress in psychological approaches to chronic pain management. *The Journal of Pain*, 15, 221-34.
- McCracken, L.M., & Vowles, K.E. (2014). Acceptance and commitment therapy and mindfulness for chronic pain: Model, process, and progress. *American Psychologist*, 69, 178.
- McCracken, L.M., Gutiérrez-Martínez, O., & Smyth, C. (2014). "Decentering" reflects psychological flexibility in people with chronic pain and correlates with their quality of functioning. *Health Psychology*, 32, 820.
- McCracken, L.M., Vowles, K.E., & Eccleston, C. (2004). Acceptance of chronic pain: component analysis and a revised assessment method. *Pain*, 107, 159-66.
- McHugh, L. (2015). A Contextual Behavioural Science approach to the self and perspective taking. *Current Opinion in Psychology*, 2, 6-10.
- Mislevy, R.J. (1986). Recent developments in the factor analysis of categorical variables. *Journal of Educational Statistics*. 11, 3-31.
- Morley, S., Davies, C., & Barton, S. (2005). Possible selves in chronic pain: Self-pain enmeshment, adjustment and acceptance. *Pain*, 115, 84-94.
- Mundt, J.C., Marks, I.M., Shear, M.K., & Greist, J.M. (2002). The Work and Social Adjustment Scale: a simple measure of impairment in functioning. *The British Journal of Psychiatry*. 180, 461-4.
- Pincus, T., Pearce, S., McClelland, A., & Turner-Stokes, L. (1993). Self-referential selective memory in pain patients. *British Journal of Clinical Psychology*, 32, 365-74.

- Reckase, M.D. (1985). The difficulty of test items that measure more than one ability. *Applied Psychological Measurement*, 9, 401-12.
- Tang, N.K., Goodchild, C.E., Hester, J., & Salkovskis, P.M. (2010). Mental defeat is linked to interference, distress and disability in chronic pain. *Pain*, 149, 547-54.
- Toye, F., Seers, K., Allcock N., Briggs M., Carr, E., Andrews J, et al. (2013). A meta-ethnography of patients' experience of chronic non-malignant musculoskeletal pain. *Health Services and Delivery Research*, 1(12).
- Vowles, K. E., Sowden G., & Ashworth, J. (2014). A comprehensive examination of the model underlying Acceptance and Commitment Therapy for chronic pain. *Behavior Therapy*, 45, 390-401.
- Wirth, R. J., & Edwards, M. C. (2007). Item factor analysis: current approaches and future directions. *Psychological Methods*, 12(1), 58.
- Yu, L., Norton, S., & Harrison, A., & McCracken, L.M. (2015). In search of the person in pain: A systematic review of conceptualization, assessment methods, and evidence for self and identity in chronic pain. *Journal of Contextual Behavioral Science*, 4, 246-262.

Table 1 Factor loadings with oblique rotation, discrimination pattern (slope parameters), and category intercepts for the twenty items from SEQ.

Item	Factor loadings		Discrimination				Item difficulty			
	F1	F2	a 1	a 2	d 1	d 2	d 3	d 4	d 5	d 6
2	0.59		0.83	0.19	-2.41	-1.55	-0.80	0.56	1.26	2.15
4	0.65		0.95	0.10	-2.24	-1.27	-0.45	0.77	1.56	2.28
5	0.73		1.21	0.00	-2.63	-1.53	-0.45	0.85	1.70	2.45

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6	0.76	1.12	-0.06	-2.33	-1.64	-0.88	0.40	1.20	1.94
7	0.68	1.02	0.20	-2.29	-1.46	-0.89	0.60	1.46	2.10
9	0.66	0.89	0.08	-1.79	-1.08	-0.54	0.40	1.09	1.66
11	0.63	0.81	0.06	-1.82	-1.26	-0.69	0.37	1.08	1.74
15	0.31	0.41	0.41	0.55	-2.09	-1.57	-0.94	0.18	0.77
19		0.46	0.37	0.60	-2.02	-1.29	-0.64	0.34	0.92
21	0.35	0.45	0.49	0.62	-2.24	-1.53	-0.81	0.50	1.28
23		0.48	0.33	0.65	-1.93	-1.38	-1.00	0.31	1.10
26		0.61	-0.03	0.79	-2.15	-1.58	-1.10	-0.17	0.58
27		0.80	-0.01	1.34	-2.56	-2.01	-1.35	0.12	1.05
28		0.76	0.06	1.25	-2.93	-2.27	-1.61	-0.02	0.88
29		0.65	0.21	0.96	-2.53	-2.02	-1.39	-0.25	0.51

Note. F= factor; a= item discrimination in each factor, this indicates the ability or sensitivity of the item in differentiating people at level of the latent trait (underlying the dimension). d= item difficulty (d1 represents the point, on the continuum of the latent trait, at which the probability of (participants) endorsing "0" is equal to the probability of endorsing "1", d2 represents the point at which the probability of endorsing "1" is equal to the probability of endorsing "2", and so forth). For instance, item 5 was the most differentiating at level of the latent trait underlying dimension1 (a1=1.21). The level of the latent trait needs to increase by 1.1 unit (d2-d1) for it to be more likely that participants endorse "1" rather than "0", while for item 2 the level of the latent trait needs to increase by 0.86 unit (d2-d1) for it to be more likely that participants endorse "2" rather than "1". This indicates that item 5 is more difficult than item 2 at the lower end of the latent trait continuum.

Table 2 Complete item pool of the Self Experiences Questionnaire.

1	My thoughts and feelings overwhelm me
* 2	Although I can get caught up with my own thoughts, emotions and sensations, I can also separate myself from them

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- | | |
|------|--|
| 3 | I am sensitive to changes in my feelings or emotions |
| * 4 | I am able to step back from my emotions and observe them from a separate point of view |
| * 5 | I am able to separate myself from my thoughts and feelings |
| * 6 | I have thoughts and feelings but am not defined as just my thoughts and feelings |
| * 7 | I can experience a distinction between my experiences and the "I" who notices these experiences |
| 8 | My life has changed and I no longer know who I am |
| * 9 | I can actually see that I am not my thoughts |
| 10 | I can have a feeling and not know what it is |
| * 11 | I experience my self as more than my thoughts and feelings |
| 12 | I find myself dwelling on who I used to be with a sense of loss |
| 13 | I am who I think I am |
| 14 | When my awareness of the present moment is lost I can return to it |
| * 15 | The health, appearance, and feelings of my body change, but the sense of my self who is aware of these changes is the same |
| 16 | I have certain traits and qualities as a person, and these are the real me |
| 17 | I find myself defending who I am and cannot let it go |
| 18 | I feel empty as a person and distressed by this |
| * 19 | When I feel distressed I can notice what is happening without being overwhelmed |
| 20 | I have the experience that important parts of who I am have been lost |
| * 21 | I can notice what I am thinking and feeling without getting too caught up in these experiences |
| 22 | I feel out of touch with myself |
| * 23 | Above all my experiences, there is a sense of my self who is noticing them |
| 24 | It is important that my thoughts about myself reflect who I really am |
| 25 | It is important that my thoughts about myself are positive |
| * 26 | I can notice that my mind is thinking from moment to moment |
| * 27 | I can observe experiences in my body and mind as events that come and go |
| * 28 | I am able to remain aware of my experiences from moment to moment |
| * 29 | My roles change depending on time, place and setting, but the sense of my self who has the roles stays the same |
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Note. * The fifteen items from the final version of the SEQ. Item 2, 4, 5, 6, 7, 9, 11 loaded onto factor 1 (F1, as

shown in table 1). Item 15, 19, 21, 23, 26, 27, 28, 29 loaded onto factor 2 (F2, as shown in table 2).

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Table 3 *Correlations between subtotal scores from the two factors of and the total score from the fifteen item SEQ with measures of psychological flexibility and daily functioning.*

	Pain acceptance (CPAQ-8)	Decentering (EQ)	Committed action (CAQ-8)	Depression (PHQ-9)	Work and social adjustment (WSAS)	Pain interference (BPI)
Self-as- distinction	.36***	.64***	.35***	-.26***	-.14**	-.17***
Self-as- observer	.25***	.56***	.31***	-.11*	-.09*	-.06
Contextual self (SEQ total)	.34***	.66***	.36***	-.20***	-.13**	-.13**

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4 *Hierarchical regression analyses for depression, work and social adjustment, and pain interference*

Block	Predictor	Adjusted R^2	ΔR^2	β
<i>Depression (PHQ-9)</i>				
1	Pain (0-10)	.13***	.11***	.36***
2	Contextual self	.18***	.05***	-.23**
1	Pain (0-10)	.13***	.11***	.32***
2	Pain acceptance (CPAQ-8)	.23***	.10***	-.29***
3	Contextual self	.25**	.02**	-.15**
1	Pain (0-10)	.13***	.11***	.32***
2	Committed action (CAQ-8)	.32***	.19***	-.41***
3	Contextual self	.33	.01	-.08
<i>Work and social adjustment (WSAS)</i>				

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1	Pain (0-10)	.11***	.11***	.36***
2	Contextual self	.14***	.03***	-.17***
1	Pain (0-10)	.11***	.11***	.30***
2	Pain acceptance (CPAQ-8)	.25***	.14***	-.37***
3	Contextual self	.25	.00	-.05
1	Pain (0-10)	.11***	.11***	.34***
2	Committed action (CAQ-8)	.16***	.05***	-.19***
3	Contextual self	.17*	.01*	-.10*
<i>Pain interference (BPI)</i>				
1	Pain (0-10)	.25***	.22***	.49***
2	Contextual self	.27***	.02***	-.15**
1	Pain (0-10)	.25***	.22***	.44***
2	Pain acceptance (CPAQ-8)	.35***	.10***	-.32***
3	Contextual self	.35	.00	-.06
1	Pain (0-10)	.25***	.22***	.48***
2	Committed action (CAQ-8)	.27***	.03***	-.13***
3	Contextual self	.28*	.01*	-.11*

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. None of the demographic variables contributed significantly to the variance explained in any of the models, thus they were not shown in the table. The numbers of blocks indicate relative order of the shown blocks in hierarchical regression models. For each outcome measure, SEQ was first examined in the model including pain and SEQ as predictors, and then in the model including pain, CPAQ-8, and SEQ as predictors, and at last in the model including pain, CAQ-8, and SEQ as predictors.

Highlights

Self-related processes in the Psychological Flexibility model are under-investigated.

Appropriate measures of self-related processes in the PF model are lacking.

A three-dimension conceptualization of the self rooted in the PF model can serve as guide.

A measure of the self was developed based on this model in a chronic pain sample.

This preliminary measure of contextual self showed adequate reliability and validity.

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